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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/801,606	03/17/2004	Osamu Kusumoto	60188-807	4190

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EXAMINER	
HU, SHOUXIANG	
ART UNIT	**PAPER NUMBER**
2811	

DATE MAILED: 09/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/801,606	KUSUMOTO ET AL.	
	Examiner	Art Unit	
	Shouxiang Hu	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) *10-22* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claims 10-22 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 20050727.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (AAPA) in view of Teong (US 6,025,634) and/or Yokohama (Yokohama et al., US 6,887,747).

AAPA discloses a silicon carbide semiconductor device (Fig. 9; a DMOS-type FET; also see the relevant descriptions in the instant specification), comprising: a semiconductor layer made of silicon carbide (101-105); an electrode (108; a source electrode); and interlayer dielectric film (110; SiO2); a gate electrode (109); and, an interconnection (111), wherein the source electrode (108) naturally comprises a first electrode portion (the lower and middle portion of 108; in ohmic contact with the

semiconductor layer) and a second electrode portion (the rest of 108), wherein the second electrode portion is in direct contact with the interlayer dielectric film (110)

AAPA does not expressly disclose that the first and second portions of the source electrode can be formed of two different materials with the second portion being between the first portion and the interlayer dielectric film. However, one of ordinary skill in the art would readily recognize that such as source electrode can be desirably formed for either protecting the source contact layer and/or for further reducing the source electrode resistance, as evidenced Teong and/or Yagishita. Teong teaches to form a source electrode (Fig. 5B), including a first portion (a portion of 42a', a silicide), and a second portion (a portion of 44a, a metal barrier, which naturally protects the underlying first portion and/or further reduces the source electrode resistance) formed between the first portion and the interlayer dielectric film (46a), wherein the second portion is in direct contact with the interlayer dielectric film (46a). And, Yagishita also teaches to form a source electrode (Fig. 1), including a first portion (at least the side portion(s) of 115, a silicide), and a second portion (at least the side portion(s) of 114, a metal layer, which naturally protects the underlying first portion and/or further reduces the source electrode resistance) formed between the first portion and the interlayer dielectric film (116), wherein the second portion is in direct contact with the interlayer dielectric film (116).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the double-layered source electrode structure of ether one of Teong and Yagishita, so that a semiconductor device with

desired source contact protection and/or with desirably reduced source electrode resistance would be obtained.

Regarding claim 2, it is noted that at least the source electrode in Yagishita has the second portion (a bottom portion of 114) that covers a top face and side faces of the first electrode portion (115), in the sense that the surface of the region 115 is a curved one, which can include multiple side faces at the side portions and a top face at the center top portion.

Regarding claim 4, it is noted that at least AAPA expressly teaches that the bottom portion of the source electrode (108) can comprise Ni; and Ni is one of the commonly recognized source electrode materials in the art.

Regarding claim 5, it is noted that at least Teong expressly teaches that the second portion (44) of the source electrode can include Ti element among others; and Ti is also one of the commonly recognized source electrode materials in the art.

Regarding claim 8, it is noted that, the possible materials used in the second electrode portion of the source electrode in the above collectively taught device include: Ni or Ni silicide, as taught in AAPA 9 (see page 2, lines 21 and 22 of the instant specification); titanium nitride or titanium-tungsten, as taught in Teong (col. 11, lines 57-60); and, Er, as taught in Yagishita (see col. 5, line 62). And, each of these possible materials is an art-known stable conductive material that can be used, as well known in the art, to form a gate electrode layer. Accordingly, it would be well within the ordinary skill in the art to form the above collectively taught material with the gate being formed of any of the possible materials that would be used to form the second electrode portion

of the source electrode therein, so as to form a device with a desired stable gate electrode, since any of these materials is an art-known material that is well suited for the intended use. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Regarding claim 9, it is noted that the layer 101 in AAPA is readable as a substrate. It also includes the recited well region (103), contact regions (104); source regions (105); gate insulator 106; and, the drain electrode (107)

Response to Arguments

Applicant's arguments with respect to the claims rejected above have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shouxiang Hu whose telephone number is 571-272-1654. The examiner can normally be reached on Monday through Thursday, 7:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SH
September 12, 2006

SHOUXIANG HU
PRIMARY EXAMINER